

Hurricane & Tropical Storm Aircraft Operations

The following is a brief synopsis of the different missions flown by the 53WRS Hurricane Hunter aircrews, our operating procedures and expectations.

High Altitude Synoptic Tracks (FL230 and Above): This mission is flown to determine the steering winds of the storm.

- Flight operations: IFR.
- Altitudes: Above FL230 in a 2,000' Block.
- Flight plan – 1801 regular routing.
- Special Considerations:
 - **Priority Handling** (to meet TOT) – requests to change routing to meet National Hurricane Center (NHC) computer Model requirements.
 - **Block Altitude** (Typical) – An ALTRAV is normally provided but not required as long as the routing and desired altitudes are granted. FL230B250 or FL290B310.
 - **Windsonde Meteorological Instrument:** Releasing a weather instrument at flight level at predetermined points which descends to the surface at about 2500FPM.
 - **Aircraft Limitations:**
 - Non-RVSM capable.
 - Communication relays might be required thru SATCOM Data link with 53WRS Operations or CARCAH (squadron liaison to NHC) if normal HF or VHF is not possible.

Low Altitude Missions - Hurricane/Tropical Storm & Low Level Invest Missions (2 Different Missions).

Hurricane or Tropical Storm missions. These missions are normally flown at a Flight Level of 100 or 50. These weather missions are flown with an altimeter setting of 29.92 which results in a typical change in radar altitude of 2,500 to 3,500 feet from the outer boundaries of the storm to the center. Due to this change in radar altitude and fluctuations in altitude due to micro-bursts and turbulence – we require a block altitude to fly in.

Hurricane/Tropical Storm (FL120 and Below, Altimeter - 29.92)

- Flight operations: IFR
- Typical Block Altitudes: FL120B50, FL070B30, or FL100B Surface
- International Flight plan (1801): with en route delay of 6 to 9 hours within 125nm around storm center
- Special Considerations:
 - **Priority Handling** (to meet TOT) – to include requests to change routing to meet NHC computer Model requirements.
 - **Aircraft Limitations:** Communication relays to ATC Missions Desk will be required thru SATCOM Data link with 53WRS Operations or CARCAH.

Low Level Investigation missions. These missions are normally flown between 500 to 1,500' Radar Altitude over the water's surface. The crew is attempting to locate a low pressure system and flies random patterns looking at surface wind fields.

Low Level Invest Operations (FL20 to Surface, Altimeter - 29.92)

- Flight operations: IFR
- Block Altitude: FL20 to Surface
- International Flight plan (1801): with en route delay of 6 hours within 125nm around coordinates
- Special Considerations:
 - **Priority Handling** (to meet TOT) – to include requests to change routing to meet NHC computer Model requirements.
 - **Aircraft Limitations:** Communication relays to ATC Missions Desk will be required thru SATCOM Data link with 53WRS Operations or CARCAH.

For both of these low altitude missions the following common conditions apply:

1. **Weather Conditions.** Flown in IMC and VMC.
2. **Altitude.** Require a Block Altitude.
3. **Updating clearance.** The center of the storm is constantly changing or is unknown for the initial entry. When new center coordinates are known by the aircrew an updated clearance (with new center coordinates, a radius around these coordinates and a block altitude) will be required. There also needs to be the flexibility to transition from one mission to another (i.e., Low Level Invest to Hurricane), or abort the mission and return to base.

4. **US land mass.** These missions require approximately 125nm radius around the center coordinates, but typically this airspace does not need to be over the US land mass. The crew will fly up to and along the coast line.
5. **Airspace.** These missions transit many different sectors of airspace control within short periods of time, to include Warning and Alert Areas, Approach, Oceanic, ARTCC, FIR, and Control Towers to name a few. For the Low Level Invest mission air traffic is a hazard.
6. **Continuous accurate communications.** Communications with ATC facilities or relays to these facilities using VHF, UHF or HF is difficult at best. However, the aircraft is equipped with and continuously transmitting weather data to the NHC via a SATCOM data link. There is no SATCOM voice capability at this time but this data link does have a capability similar to email and is used to relay operational messages back and forth to Squadron Operations and CARCAH. These organizations operate 24/7 during flight operations.
7. **Entering or exiting the storm.** Due to the weather hazards (Heavy icing, lightning, micro-bursts, & extreme turbulence) associated with Hurricanes, Tropical Storms or Thunderstorms the crews typically need to enter or exit the storm at a point 110nm from the storm center and at an altitude of FL120 or less to avoid encountering them. For entry this requires a descent to be started 40 to 60 nm prior to this point. For exiting the storm, the crews need to have a clearance to climb at this point for on-board fuel considerations.

Low Altitude Buoy Air Drop Missions. This mission is flown approximately 200nm ahead of the storm path. Typically 2 aircraft airdrop 10 – 15 Sea surface buoys each at predetermined locations.

Low Altitude Buoy Air Drop Operations.

- Flight operations: IFR
- Block Altitude: FL20 to Surface
- International Flight plan (1801): 1801 regular routing, some airdrop points may need to be modified en route.
- Special Considerations:
 - **Aircraft Limitations:** Communication relays to ATC Missions Desk will be required thru SATCOM Data link with 53WRS Operations or CARCAH.

53WRS Hurricane Hunters - Concept of operations in the Low Altitude Mission environment:

Hurricane operations are simple from the aspect that few other aircraft fly in the storm area. However, the same cannot be said of flying the Low Level Invest mission. The Low Level Invest can have a wide variety of weather conditions associated with it from little to no weather and few clouds, to a wide area of Thunderstorms, to a full blown Hurricane or Tropical Storm already present. During times of fair weather, it is possible to transit through airspace with IFR, VFR or Military traffic present while conducting weather operations. It is this environment we consider most hazardous to safe flight operations.

The Operational Goal is to keep both flight operations and Controller requirements as simple, flexible, consistent, and safe as possible. In addition, it is also our desire to not request more airspace be dedicated to our exclusive operation then is necessary. To accomplish these goals we propose the following rules apply to flight operations:

1. **Area of Operations.** Only one specific clearance will be requested from ATC to operate in the storm environment. The storm environment is defined as a Block Altitude with a radius around a set of coordinates (**ex. Teal 27 requests IFR clearance: coordinates, radius 125nm, FLXXBXXX**) but does not include flight within 25nm of land until radio and radar contact are established.
 - a. **Flight in multiple ATC sectors.** One ATC/Military agency will be designated to coordinate with the aircraft and will coordinate with all other ATC/Military agencies.
 - b. **Communications with ATC.** Communications with ATC will be maintained through VHF voice or SATCOM relay. Voice Communications & Radar contact will be established with Controlling Agency prior to flying within 25NM of land.
 - c. **RADAR Contact.** If not in radar contact within 25nm of the coast - the aircraft will make position reports off of designated Nav aids along the coast, and will be allowed flight up to the coast traffic permitting.
2. **IFR Clearance.**
 - a. **Due Regard.** The Operational Prerogative of flying Due Regard or “Operational” will not be exercised. The mission will be flown 100% under IFR criteria and the IFR Clearance will remain active throughout the flight. However, it is still at the discretion of the Aircraft Commander to deviate from clearances and normal operating procedures during an Emergency.
 - b. **Controlled and Uncontrolled Airspace.** Because we may be transitioning back and forth between these two different types of airspace many times during our mission we will simplify procedures and treat these areas as the same. Even though these areas are technically different and different rules for flying in these two types of

airspace apply, ATC and Flight operations will not differentiate between the two. Aircrews and ATC will follow normal Controlled Airspace procedures.

c. In uncontrolled airspace aircrews:

- Will maintain communication with ATC (voice or SATCOM relay).
- Will request changes to our IFR Clearance as if we were in controlled airspace.
- Recognize that if there is a non-participating aircraft that has not complied with the ICAO requirement to maintain communications and make position reports with ATC that there is no way possible for ATC to provide aircraft separation for us. The aircrew will be utilizing TCAS and normal "See and Avoid" procedures to the max extent possible.

3. SATCOM Data Transmission Clearance Relay in Operations area.

a. **Clearance.** Center Coordinates (Storm Coordinates), Radius around those coordinates, & Altitude Block.
Note: This clearance does not include flight within 25nm of the coast until Radar and Radio contact are established.

b. **Clearance Modification.** Request for Modification to Clearance will be attempted in the following order:

1. Voice Communication (VHF or UHF) direct with ATC.
2. SATCOM data link thru 53WRS Squadron Operations or CARCAH.

4. Entering Storm Operations Area.

a. **Routing.** The aircraft will fly the routing as per filed flight plan or as coordinated en route with ATC.

b. **Descent.** The Descent into the storm will be started prior to entering the storm operating area.

c. **SATCOM Relay.** If aircrew is unable to request descent clearance over normal voice communications then the request will be relayed through SATCOM:

1. Example: Teal XX Position XXXXNXXXXXXW Time XXXX FLXXX requests Pilot Discretion Descent to FLXXX

5. Exiting Storm Operations Area.

a. **Routing.** The aircrew will remain in the operations area until exit clearance is obtained, but will continue toward the Exit Point if able. The Exit Point being requested direct to may or may not be in the current operations area.

b. **Climb.** The aircrew will maintain the previous block altitude until a revised altitude clearance is obtained. The crew will not climb until clear of all hazardous weather. Due to this a Pilot Discretion Climb is desired.

c. **SATCOM Relay.** If the aircrew is unable to request exit clearance over normal voice communications then the request will be relayed through SATCOM:

2. Example: Teal XX position XXXXN XXXXXW FLXXX REQUEST direct to position XXXXNXXXXXXW Flight Planned Route. At position XXXXNXXXXXXW REQUEST Pilot Discretion Climb to FLXXX.

6. Several Aircraft in the Storm Environment at the same time:

- USAF 53WRS Hurricane Hunter Aircraft – Call Sign "Teal XX"
- NOAA Hurricane Aircraft – Call Sign "NOAA XX"

Teal and NOAA aircraft accept responsibility for maintaining their own aircraft separation while operating in the storm environment. Operating procedures already established in the NHOP will be followed. The aircraft will be coordinating through voice and utilizing TCAS to provide safe altitude and route separation.

Miami Center will provide the following products to facilitate communication of the area of operations:

- Map to include bulls-eyes, frequencies, warning and alert areas – provided to Hurricane Hunter Squadron.
- Operations Area FAX – provided to effected ATC facilities.

ATC Missions desk will coordinate with all agencies flight operations thru warning areas, SUA's etc.